F/V *Double Decker* Species Assemblage Survey of Hecate Strait, Jan. 30–Feb. 19, 1986

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ABSTRACT

Fargo, J., and D. Davenport. 1986. F/V DOUBLE DECKER species assemblage survey of Hecate Strait, Jan. 30-Feb.19, 1986. Can. Data Rep. Fish. Aquat. Sci. 603: 106 p.

During Jan.-Feb. 1986, the F/V DOUBLE DECKER completed its portion of a two-vessel synoptic trawl survey of groundfish species occupying the shelf area (10-120 fath; 18-216 m) of Hecate Strait during winter. A previous survey was conducted in May-June 1984. The purpose of the surveys is to collect information on species assemblages in the form of species catch composition data. This is the first step towards development of an ecological basis for mixed-species stock assessment. This report contains the results of the survey -- weight and number caught and length-frequencies by haul (58 usable).

Key words: Groundfish species assemblages, survey, mixed species stock assessment, Hecate Strait.

RESUME

Fargo, J., and D. Davenport. 1986. F/V DOUBLE DECKER species assemblage survey of Hecate Strait, Jan. 30-Feb.19, 1986. Can. Data Rep. Fish. Aquat. Sci. 603: 106 p.

Le DOUBLE DECKER a, en janvier et février 1986,effectué les chalutages qui lui étaient assignés dans le cadre d'un relevé synoptique au chalut par deux bateaux portant sur les espèces de poissons de fond occupant le plateau (10 à 120 brasses; 18-216 m) du détroit d'Hécate au cours de l'hiver. Un relevé du même genre avait été réalisé en mai et juin 1984. Ces relevés avaient pour objectif de recueillir des renseignements sur les groupes d'espèces se présentant sous la forme de données sur la composition des espèces capturées. Ces travaux constituent la première étape de l'établissement d'une base de données écologiques pour l'évaluation des stocks à espèces mixtes. Le présent rapport contient les résultats du relevé: poids, nombre et fréquences des longueurs des poissons capturés par trait de chalut (58 utilisables).

Mots-clés: Groupes de poissons de fond, relevé, évaluation de stocks à espèces mixtes, détroit d'Hécate

INTRODUCTION

This work was carried out as part of the Pacific Biological Station's Hecate Strait Project. The purpose of the project is to develop an ecological basis for alternative, mixed-species stock assessment techniques. Species catch composition data from several synoptic surveys will be used to map on-bottom fish assemblages in Hecate Strait. All surveys will be coordinated with a fisheries research vessel. The first survey was conducted in May-June 1984 (Fargo et al. 1984; Westrheim et al. 1984). This report summarizes the results of the DOUBLE DECKER cruise including weight and number of species caught and size composition of species sampled. A second Data Report contains the results of the R/V G.B. REED cruise.

MATERIALS AND METHODS

FISHING VESSEL

The F/V DOUBLE DECKER, a 20-m (65-ft) fiberglass stern trawler, was the vessel chartered for the survey.

FISHING GEAR

Fishing gear consisted of a Yankee 36 trawl net (Fig. 1) connected to the vessel's 800 lb (400 kg) wooden doors by 30-fath bridles. The groundline consisted of 7-inch rubber discs on 5/8 x 6 x 19 steel cable, and was suspended from the fishing line by 6 links of 1-inch chain beckets at intervals of 61 cm (24 in). The net used by the F/V DOUBLE DECKER contained 5.5-in (137-mm) mesh in the wings and body while the net used by R/V G.B. REED contained 3.5-in (88-mm) mesh in the wings and body.

SURVEY DESIGN

The survey design for this survey was essentially the same as that for the first survey conducted in May-June, 1984 described in Fargo et al. 1984. The F/V DOUBLE DECKER was assigned sampling stations in shallower strata while the R/V G.B. REED was assigned sampling stations in deeper strata. Strata that both vessels occupied were at intermediate depths. To facilitate further the comparison between vessels, two of the R/V G.B. REED's tows were repeated by the DOUBLE DECKER within a specified time frame.

While the number of stations and hauls per stratum was determined well in advance of the cruise, the selection of the specific location of each station within a stratum was generally a repeat of the tow location in the same block/depth strata for the May-June 1984 survey. Seven stations occupied on the 1984 survey were not repeated on this survey due to time/weather constraints.

CATCH PROCESSING

Each trawl catch was segregated by species into plastic "tubs" (ca. 50 kg capacity). The weight of each species to the nearest kg was obtained with a mechanical beam balance. The total weight for each species caught was equal to the sum of the sorted tub weights for that species in the catch.

LENGTH FREQUENCIES

Fork length was recorded to the nearest centimeter for most of the specimens caught, except spiny dogfish which were measured for total length, with the tail bent down in line with the body. To expedite measuring and recording fork lengths of moderate to large catches, the plastic-strip method (Davenport and Harling 1965) was employed. For most dogfish, sex was also recorded based on external characteristics. Exceptions to measuring all specimens caught involved (a) large catches of individual species and (b) ratfish.

For "large" catches (ca. $\geq$300 specimens) of individual species, sampling schemes were employed to reduce catch-processing time. Most schemes followed, or were modifications of, that reported by Westrheim (1967).

For ratfish, broken tails were fairly common. "Fork" length was estimated by a single sampler, and recorded to the nearest centimeter interval for these specimens.

RESULTS

A total of 59 trawl hauls were completed, of which 58 were deemed "usable" (Fig. 2). The one "unusable" haul was disqualified due to a snag.

Total fish catch from usable hauls was 11,762 kg (21,993 specimens) comprising 33 species. Principal species by weight were big skate, Pacific cod, ratfish, and English sole -- 79% of the total catch. Principal species by number were Pacific cod, English sole, and ratfish -- 55% of the total numbers caught.

Detailed records of all trawl hauls, and catch weights by species, are contained in Appendix table 1. An index to common and scientific names of all fish species caught is contained in Appendix table 2.

TRAWLING SCHEME

The DOUBLE DECKER was assigned 76 of the trawling stations from A3-3 to L4-4 (Fig. 2; Table 2).

The February survey differed from the 1984 survey in one important respect. Seven new stations were added on the west side of Moresby Gully (see Table 2). In order to accommodate this work, 10 of the stations occupied by the charter vessel in 1984 were dropped and 9 G.B. REED stations from the 1984 survey were dropped (Table 3).

One tow on the charter was inadvertently done at station J202 instead of J201, and one tow (No. 39) was unusable because of a snag. This station (G303) was subsequently occupied in Tow 40. Also, two tows (46, 47) were repeats of the G.B. REED's tows in block H407. None of the stations in blocks K and L were occupied by the charter due to time constraints.

An inventory of hauls completed by the F/V DOUBLE DECKER is contained in Table 4.

LENGTH FREQUENCIES

Fork (or total) lengths (cm) were recorded for 19,330 specimens (est. 21,993 caught). In ~90% of the hauls, all specimens caught were measured. Catch sampling occurred for 5 species in 7 hauls, and computations of total numbers caught are shown in Table 5, together with the method of sampling. Estimates of the total number of these species caught were derived using the following equation: $n = \frac{Nw}{W}$ where,

n = number of a given species weighed but not measured for a given haul
N = number of a given species measured for a given haul
w = weight of a given species not measured for a given haul
W = weight of a given species measured for a given haul

Table 1 contains an index to Appendix tables containing length-frequency (or individual length) records, by haul, for each species, as well as a record of the weights (kg) and numbers of individual species caught for usable hauls on the cruise.

PERSONNEL

J. Fargo (i/c)	Pacific Biological Station	Jan. 30-Feb. 19
D. Davenport	"	"

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Table 1. Total weight (kg) and number, by species of fish specimens caught in usable hauls during F/V DOUBLE DECKER assemblage survey, Jan. 30-Feb. 19, 1986. (See appropriate Appendix tables for length frequencies.)

Flatfish	Weight (kg)	Numbers	Appendix table
Arrowtooth flounder	274	627	3
Butter sole	384	1335	4
C-O sole	Tr	3	5
Curlfin sole	25	52	6
Dover sole	2	17	7
English sole	1046	4634	8
Flathead sole	7	92	9
Halibut	160	21	10
Pacific sanddab	166	1333	11
Petrale sole	6	12	12
Rex sole	264	1211	13
Rock sole	691	1737	14
Sand sole	40	159	15
Starry flounder	19	7	16
Sub-total	3084	11,240	
Rockfish			
S. caurinus	Tr	1	17
S. maliger	2	3	18
Sub-total	2	4	

Roundfish	Weight (kg)	Numbers	Appendix table
Eulachon	Tr	1	19
Greenlings	Tr	3	20
Lingcod	156	718	22
Pacific cod	3109	5417	23
Pacific herring	3	30	21
Pacific tomcod	Tr	3	24
Poachers	3	96	25
Sablefish	3	46	26
Sandlance	Tr	2	27
Sculpins	14	112	28
Shiner perch	77	1351	29
Walleye pollock	9	471	30
Sub-total	3374	8250	
Selachii			
Ratfish	1124	2027	31
Skates			
big	4098	447	32
black	4	3	33
longnose	39	8	34
Spiny dogfish	37	14	35
Sub-total	5302	2499	
Grand totals	11762	21,993	

Table 2. Inventory of scheduled trawl stations for the F/V DOUBLE DECKER (D) and R/V G. B. REED (R), by block and depth strata, in Hecate Strait, Jan.-Feb. 1986.

	Depth strata[a]										Scheduled hauls		
Block	1	2	3	4	5	6	7	8	9	10	D	R	Total
A-2	-	-	-	-	-	R	-				-	1	1
-3	-	-	D	D/R	R	-	-				2	2	4
B-1	D	D	D	D	R	R	R				4	3	7
-2	D	D	D	D	D/R	R	R				5	3	8
-3	D	D	D	D/R	R	R	-				4	3	7
C-2	D	-	-	-	-	-	-				1	-	1
-3	D	D	D/R	R	R	-	-				3	3	6
D-2	D	-	-	-	-	-	-				1	-	1
-3	D	D	D/R	R	-	-	-				3	2	5
-4	-	-	R	R	-	-	-				-	2	2
E-2	D	D	-	-	-	-	-				2	-	2
-3	D	D/R	R	-	-	-	-				2	2	4
-4	-	D	-	-	D/R	R	-				2	2	4
F-2	D	-	-	-	-	-	-				1	-	1
-3	D	D	D	-	-	-	-				3	-	3
-4	-	D	D	D	D	R	R				4	2	6
G-1	D	-	-	-	-	-	-				1	-	1
-2	D	-	-	-	-	-	-				1	-	1
-3	D	D	D/R	R	R	-	-				3	3	6
-4	-	-	-	D	D	D	D				4	-	4
H-2	D	-	-	-	-	-	-				1	-	1
-3	D	D/R	R	R	-	-	-				2	3	5
-4	-	-	-	-	R	R	R				-	3	3
I-2	D	-	-	-	-	-	-				1	-	1
-3	D	D	D	-	-	-	-				3	-	3
-4	D	D	D	D/R	R	R	R				4	4	8
-5	-	-	-	R	R	R	R	R[2]			-	5	5
J-2	D	-	-	-	-	-	-				1	-	1
-3	D	-	-	-	-	-	-				1	-	1
-4	D	D	-	D/R	R	R	-				3	3	6
-5	-	-	-	R	R	R	R				-	4	4
-6	-	-	-	-	-	-	-	-	R[2]	R[2]	-	2	2
K-3	D	D	D	D	D	-	-				5	-	5
-4	-	D	D	R	R	R	-				2	3	5
-5	-	-	-	-	-	R	R	R[2]			-	3	3

Table 2 (cont'd)

	Depth strata[a]										Scheduled hauls		
Block	1	2	3	4	5	6	7	8	9	10	D	R	Total
L-3	-	-	D	D	-	D	D				4	-	4
-4	-	-	-	D	D	D/R	R				3	2	5
-5	-	-	-	-	R	R	R	R[b]			-	4	4
-6	-	-	-	-	-	-	-	-	R[b]	R[b]	-	2	2
Total	23	19	20	23	20	18	12	3	2	2	76	66	142

[a]1 = 10-19 fath, 2 = 20-29 fath, 8 = 80-99 fath, 9 = 100-119 fath, etc.

[b]Stations added in 1986 to block-strata in Moresby Gully.

Table 3. Stations eliminated from the 1986 assemblage survey to be able to accommodate the addition of north Moresby Gully.

Block strata no.	1984 survey haul no.	Vessel
A2 - 05	11	G.B. REED
A2 - 07	5	G.B. REED
A3 - 06	10	G.B. REED
A3 - 07	9	G.B. REED
B1 - 05	14	F/V ARCTIC OCEAN
D4 - 01	29	F/V ARCTIC OCEAN
D4 - 02	89	F/V ARCTIC OCEAN
D4 - 03	30	F/V ARCTIC OCEAN
E4 - 03	31	F/V ARCTIC OCEAN
E4 - 04	27	F/V ARCTIC OCEAN
E4 - 07	29	G.B. REED
E5 - 02	44	F/V ARCTIC OCEAN
E5 - 03	43	F/V ARCTIC OCEAN
E5 - 04	32	G.B. REED
E5 - 05	31	G.B. REED
E5 - 06	30	G.B. REED
F4 - 05	36	G.B. REED
I4 - 05	65	F/V ARCTIC OCEAN
L3 - 05	76	F/V ARCTIC OCEAN

Table 4. Inventory of hauls, by block and depth strata, completed by the F/V DOUBLE DECKER, Jan. 30-Feb. 19, 1986.

Scheduled Block strata	Haul	Scheduled Block strata	Haul
A3 - 3	10	G3 - 1	37
- 4	11	- 3[a]	39,40
B1 - 1	14	G4 - 4	38
- 2	15	- 5	31
- 3	16	- 6	32
- 4	17	- 7	41
B2 - 1	13	H2 - 1	44
- 2	7		
- 3	8	H3 - 1	42
- 4	9	- 2	43
- 5	12		
		H4 - 7[b]	46,47
B3 - 1	3		
- 2	4	I2 - 1	45
- 3	2		
- 4	1	I2 - 1	58
		- 2	57
C2 - 1	18	- 3	49
C3 - 1	22	I4 - 1	52
- 2	5	- 2	51
- 3	6	- 3	50
		- 4	48
D3 - 1	21		
- 2	20	J2 - 2	59
- 3	19		
		J3 - 1	56
E2 - 1	25		
- 2	24	J4 - 1	53
		- 2	55
E3 - 2	23	- 4	54
E4 - 2	27		
- 5	26		
F2 - 1	36		

Table 4 (cont'd)

Scheduled Block strata	Haul
F3 - 1	35
- 2	34
- 3	33
F4 - 3	28
- 4	29
- 5	30

[a]Haul 39 unusable due to snag.

[b]Hauls 46, 47 were repeats of G.B. REED tows in block-strata H4-07.

Table 5. Calculated numbers of specimens, by species, caught for hauls in which all specimens were not measured during F/V DOUBLE DECKER assemblage survey, Jan. 30-Feb. 19, 1986.

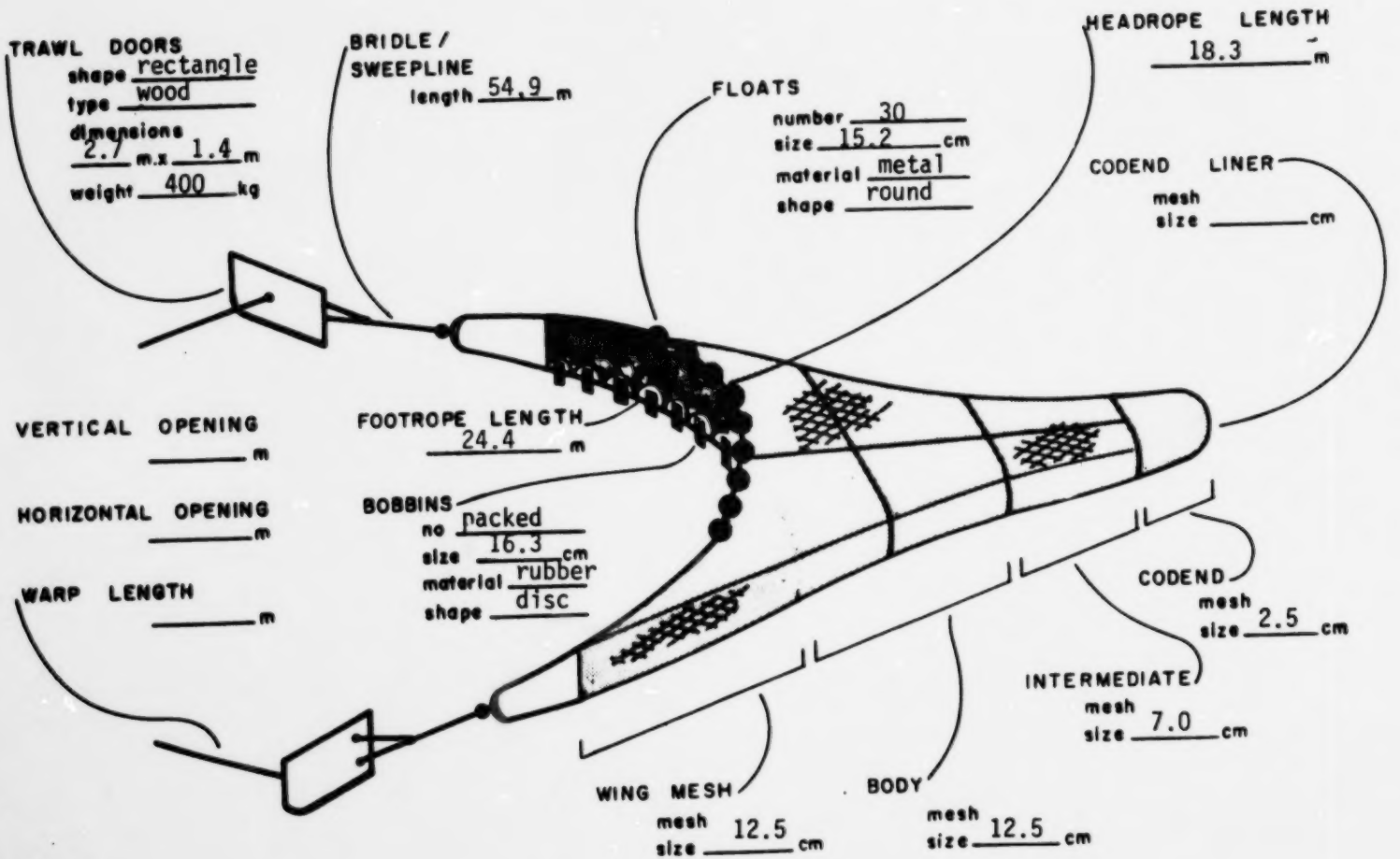
Haul				Scheduled		
no.	Species	Total	Sample	Sample	Total	Sample
6	Pacific cod	300	87	481	1659	1/1/1[a]
10	Big skate	1095	360	49	149	random
12	Big skate	1057	682	51	79	random
12	Ratfish	387	95	118	481	1/1/1[a]
41	Pacific cod	2000	177	50	565	1/1/1[a]
47	English sole	114	44	191	495	1 tub
47	Shiner perch	10	5	175	300	1 bucket

[a]1 tub each from the first, middle, and last splits of the codend.

Fig. 1. NET DIMENSIONS AND CHARACTERISTICS FOR BOTTOM TRAWL

VESSEL F/V Double Decker NET Yankee 36

OBSERVATION PERIOD Jan. 30 - Feb. 19, 1986



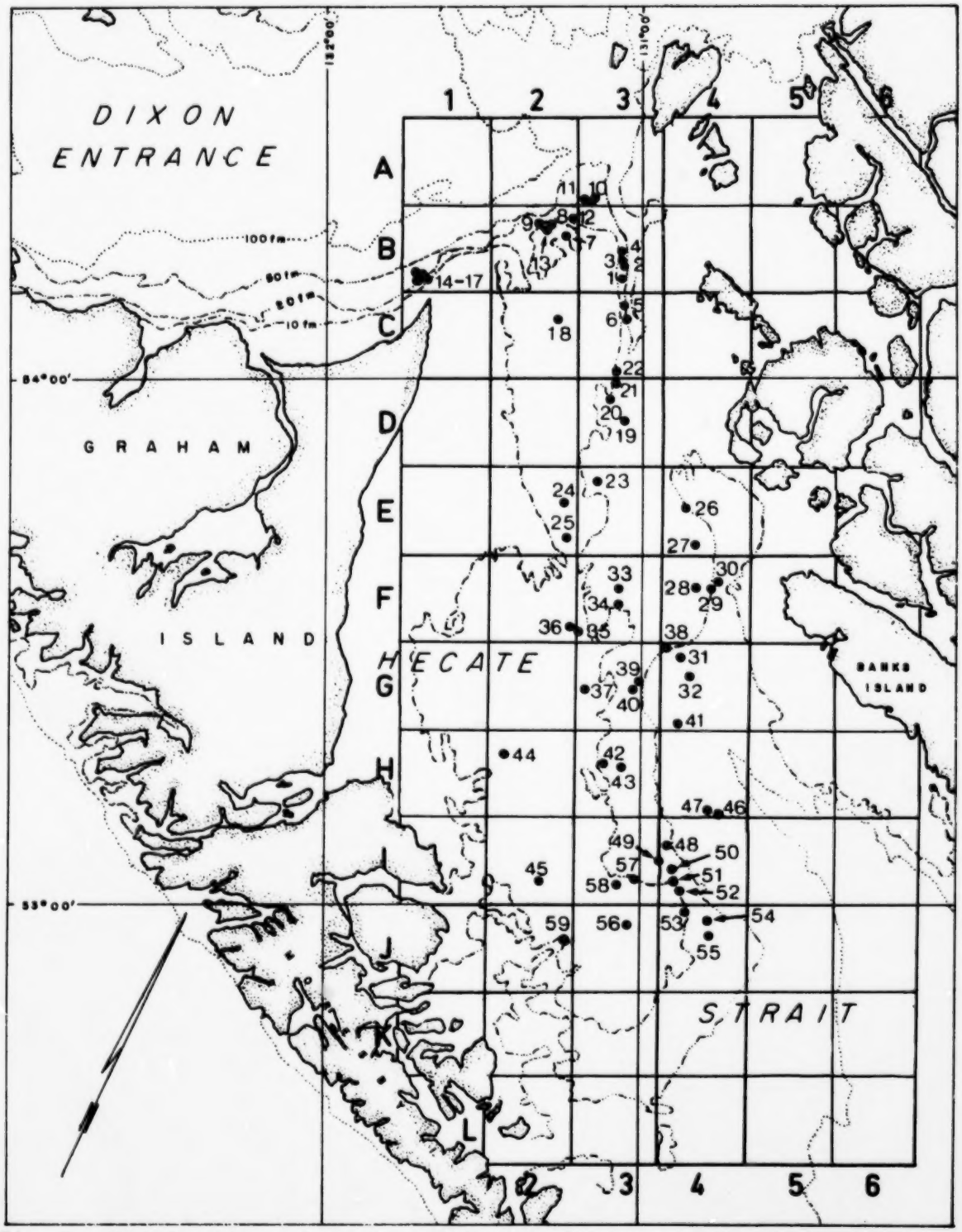


Fig. 2. Haul locations of the F/V Double Decker species assemblage survey of Hecate Strait, Jan. 30 - Feb. 19, 1986.